

KOMPANEYETS, A.

Our own business. NTO 2 no.5:56-57 My '60.

(MIRA 14:5)

1. Predsedatel' pravleniya nauchno-tekhnicheskogo obshchestva  
Yugo-Zapadnoy zheleznoy dorogi, g.Kiyev.  
(Railroads—Technological innovations)

KOMPANEYETS, A.A.

Adoption of advanced welding techniques by the Southwestern  
Railroads. Zhel.dor.transp. 42 no.12:58-63 D '60. (MIRA 13:12)  
(Ukraine--Railroads--Equipment and supplies) (Welding)

KOMPANEYETS, A. I.

Physicists

Idealism of physics in service of imperialism., Fiz. v shkole, no. 1, 1952.

9. Monthly List of Russian Accessions, Library of Congress, March 1954. Unclassified.

2

USSR/Physics - Electrodynamics of Dirac 21 Feb 52

"Concerning the New Formulation of Electrodynamics  
by Dirac," A. Kompaneyski

"Dokl Ak Nauk SSSR" Vol LXXXII, No 6, pp 873-875

Discusses the new formulation of classical electro-  
dynamics proposed by Dirac (P. A. M. Dirac, Proc  
Roy Soc 209, 291, 1951. Considers the soln of the  
Dirac Eqs for a charged sphere:

$\frac{\partial^2 \psi}{\partial x^2} = \frac{1}{2} \frac{\partial^2 \psi}{\partial t^2}$  shows that  
these eqs possess 2 solns: one soln in which the  
charges disperse, and the other soln in which the  
charges converge to the center (both in the case  
where the initially at-rest pos charge of a sphere  
is uniformly distributed in space). Submitted by  
Acad N. N. Semenov, 20 Dec 51.

214782

KOMPANEYETS, A. [1]

(PA 56 no. 668: 5450 '53)

214782

KOMPANNEYETS, A.I. (Moscow)

H.A.Umov, the originator of the energy motion equation. Fiz. v  
shkole 14 no.4:20-25 Jl-Ag '54. (MLBA 7:7)  
(Force and energy) (Umov, Nikolai Alekseevich, 1846-1915)

KOMPANEYETS, A.I.: NOZDREV, V.F., doktor fiziko-matematicheskikh nauk, redaktor.

[The struggle of N.A.Umov for materialism in physics] Bor'ba  
N.A.Umova za materializm v fizike. Moskva, Izd-vo Akademii nauk  
SSSR, 1954. 126 p. (MLRA 7:8)  
(Umov, Nikolai Alekseevich, 1846-1915)

KOMPAHEVETS, A.I. (Moskva)

The concept of force in physics. Fiz. v shkole 15 no.6:16-21  
N-D '55. (Force and energy) (MLRA 9:2)

KOMPANEYETS, Aleksey Ivanovich; BASKAKOV, V.G., otvetstvennyy redaktor;  
ROZENBERG, R.Yu., redaktor izdatel'stva; MAKUHI, Ye.V., tekhnicheskii redaktor

[A.G.Stoletov's philosophy] Mirovozzrenie A.G.Staletova. Moskva,  
Izd-vo Akademii nauk SSSR, 1956. 286 p. (MLA 10:1)  
(Stoletov, Aleksandr Grigor'evich, 1839-1896)



L 2263-66 EWT(1)/ECC GW  
ACCESSION NR: AF5010228

UR/0362/65/001/003/0335/0338

AUTHOR: Kompaniyets, A. I.

TITLE: Aerosol indicatrices of scattering of light in the free atmosphere at heights of 10 km

SOURCE: AN SSSR. Izvestiya. Fizika atmosfery i okeana, v. 1, no. 3, 1965, 335-338

TOPIC TAGS: scattered sky light, Rayleigh scattering, aerosol, airplane sounding, almucantar, zenith, azimuth, indicatrix, sky brightness

ABSTRACT: Scattered sky light consists of light scattered by first-order Rayleigh scattering, the remainder of Rayleigh scattering formed by multiply scattered light in the lower atmosphere and at the ground level, and the light scattered on aerosols. Investigations of the light scattering have been carried out by means of airplane sounding above Moscow, using an antimony-caesium cathode as the receiver. Measurements have been made at a height of 10 km on almucantars of  $45^\circ$  and  $60^\circ$  of zenithal distances at various azimuths from the solar vertical. Measurements were repeated on the ground in the same order. Graphs of indicatrices for various heights are

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ACCESSION NR: AP5010228

presented as results of processed observation data. The aerosol component of the scattered light which depends upon the state of aerosols in the atmosphere plays an important role in the brightness of cloudless skies. Orig. art. has: 3 figures, 2 tables, and 3 formulas. [EG]

ASSOCIATION: none

SUBMITTED: 16Aug63

ENCL: 00

SUB CODE: AA, NP

NO REF SOV: 008

OTHER: 000

ATD PRESS: 3251

Cord 2/2

KOMPANEYETS, A., doktor fiz.-matem.nauk

Ferromagnetism and antiferromagnetism. Radio no.4:35-39

Ap '63.

(MIRA 16:3)

(Ferromagnetism)

KOMPANEYETS, A. S. and LANDAU, L.

"The Electrical Conductivity of Metals," Gosudarst. Nauch. Tekh. Izdatel., Khar'kov,  
1935, 60 pp.

1ST AND 2ND SHEET																									
PROCESSES AND PROPERTIES INDEX																									
<p>3C</p> <p style="text-align: right;">F-1</p> <p><b><math>\beta</math>-Disintegration induced by a central collision of an electron with a heavy particle. A. KOW. PANNE (Physical. Z. Sovietunion, 1937, 12, 138-147).—Theoretical. The probability that a fast electron colliding centrally with a heavy particle (proton or neutron) will bring about a <math>\beta</math>-disintegration is calc. A. J. M.</b></p>																									
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KOMPANEYETS, A. S.

"Absorption of Sound by Crystals at High Temperatures," Dokl. AN SSSR,  
14, No.5, pp 267-270, 1937

Inst. Phys. Tech., Dnepropetrovsk

KOMPANEYETS, A. S.

"Induced Beta Disintegration of Heavy Particles with Simultaneous Appearance of Quanta," Zhur. Eksper. i Teoret. Fiz., Vol. 8, page 1077, 1938

The effective cross-section of the  $\beta$ -decay of heavy particles induced by very hard gamma-rays with simultaneous radiation of another hard quantum is given by approximately 10-40 sq. cm. for cosmic rays.

*Dnepropetrovsk State U.*

KOMPANEYETS, A. S.

"Residual Stresses in Quenched Cylindrical Specimens," Zhur. Tekh. Fiz.,  
9, No.4, pp. 287-294, 1939

Dnepropetrovsk Phys.Tech. Inst.



KOMPANEYETS, A. S.

"On the Viscosity of the Electron Liquid in Metals," Zhur. Eksper. i Teoret. Fiz.,  
9, No.8, pp. 920-926, 1939

Ukr. Phys.Tech. Inst., Khar'kov

KOMPANEYETS, Dr. A. S.

"Recoil Electron Spectrum of Gamma-Rays from RaC," Journal Phys., Vol. 3, Nos. 4-5, 1940. <sup>1251</sup> (Physico-Tech. Inst., Acad. of Sciences of the Ukrainian SSR, Karkov)

A method of analysing energies of recoil electrons is developed; it consists essentially of a magnetic spectrograph with two Geiger-Müller counters for recording the electrons by the coincidence method. The method is applied to the examination of the recoil-electron spectrum of Ra-C. The energy spectrum shows a no. of peaks. Comparison with the internal conversion positron spectrum indicates that the relative intensities of the  $\gamma$ -lines of Ra-C obtained from the positron spectrum and the recoil-electron spectrum are the same. The theoretical curve calc. from Jaeger and Hulme's theory which gives the dependence of the internal conversion coeff. on the  $\gamma$ -ray energy for quadripole transitions is verified. The principal hard  $\gamma$ -lines of the Ra-c spectrum are of quadripole origin.

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<p><i>Ca</i></p> <p><b>Spectrum of recoil atoms from radium C<sub>γ</sub> rays</b> (1) L. L. Latyshev, A. S. Kompanets, N. P. Bortsov and I. M. Gursak. <i>J. Exptl. Theoret. Phys.</i> (U. S. S. R.) 10, 986 (1940). The recoil atoms are analyzed by means of a magnetic spectrograph. The energies, relative intensities and multiplicities (usually quadrupole) of 12 γ-lines with <math>\epsilon</math>, kv. from 1100 to 1420 were detd. These data satisfy the theoretical curve obtained by Jager and Hulme (<i>Proc. Roy. Soc. (London)</i> 140A, 708 (1933); C. I. 29, 3229) for inner conversion of γ-rays. E. H. Rathmann</p>																										<p><b>3</b></p>																									
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VIBRATIONAL OVERTONES OF POLYATOMIC MOLECULES. A.																																																																													
<p>Vibrational overtones of polyatomic molecules. A. KOMPANEVETS, <i>J. Exptl. Theoret. Phys.</i> (U. S. S. R.) 10, 1175-7 (1940).—Theoretical-math. The conditions under which mol. symmetry groups yield wave functions are considered. P. H. RATHMANN</p>																																																																													
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KOMPANEYETS, A. (S.)

"On the Absorption of Light by Plasma," Zhur. Eksper. i Teoret. Fiz., Vol. 14, No. 6, 1944. (Central Asian State Univ., Tashkent -1943-) pp. 171-176

It is known that free electrons do not absorb light. It would therefore appear that a completely ionized gas at a sufficiently high temperature would have a very low absorption coefficient. To verify this, a mathematical investigation of the propagation of electromagnetic oscillations in a plasma is presented. It is shown that owing to the forces acting between the electrons and the positive ions of the plasma the latter possesses a considerable absorption coefficient. This absorption, as distinct from the photoelectric absorption, does not decrease with the frequency of the light wave and the temperature of the plasma. A formula (37) is derived determining the absorption coefficient, and methods are indicated for carrying out the necessary calculations. .

1ST AND 2ND CATEGORIES		3RD AND 4TH CATEGORIES	
<p><b>KOMPANEVETS, A.D.</b></p> <p>Multiple scattering of fast electrons and <math>\alpha</math>-particles in heavy elements. A. Kompaneets (Phys. Tech. Inst., Acad. Sci. U.S.S.R.). J. Phys. (U.S.S.R.) 9, No. 1, 17-24 (1945). -- Math. An expression is given for angular distribution functions within a thin plate. The half-width is 20 to 20% smaller than by Williams' and Goudsmit and S. L. Gerhard's formulas.</p> <p>Also in ZHUR. EKSPER. i Teoret. Fiz. 15, No. 6, 1945</p> <p>" " <del>ZHUR. Fiz.</del> +</p>			
<p>ASB-5LA METALLURGICAL LITERATURE CLASSIFICATION</p>			
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C. Q. KOMPANEVETS, A. L. J.

32.

1951

No. 12

Multiple scattering of thin beams of fast electrons. A. KOMPANEVETS (Acad. Sci. Ukr. S.S.R., Kiev), *Zhur. Eksp. i teoret. fiz.* 17/10:40-42 (1947).—Different half-widths of the angular distribution should be obtained depending on whether the measurements are made with a long or with a short counter. In the 1st instance, the counter will register all electrons deviating by a certain angle from a plane, and the distribution obtained is one over plane angles. In the 2nd instance, the counter will register all electrons contained within a certain solid angle. Neither distribution is gaussian, but numerically they are close to it. N. Thon

KOMPANEYETS, Dr. A. S.

"Residual Stresses in Quenched Test Pieces of Cylindrical Shape," Zhur. Tekh. Fiz.,  
Vol. 9, 1949.



1. The first of the two main parts of the report is a description of the results of the experiments. The second part is a discussion of the results and a comparison with the results of other experiments.

KOMPANEYETS, A. S., VOYEVODSKIY, V. V.

Nuclear Fission

Chain reactions in computing diffusion of two active centers. Zhur. eksp. i teor. fiz.  
23 No. 2, 1952.

Monthly List of Russian Accessions, Library of Congress, December 1952, UNCLASSIFIED.

U.S. AIR FORCE RESEARCH AND DEVELOPMENT

U.S. AIR FORCE RESEARCH AND DEVELOPMENT

U.S. AIR FORCE RESEARCH AND DEVELOPMENT

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U.S. AIR FORCE RESEARCH AND DEVELOPMENT

KOMPANEYETS, A. [S.]

Application of the self-adjusting field method to the nucleus. Dokl. Akad. Nauk SSSR 85, No.2, 301-4 '52. (MLRA 5:8)  
(PA 56 no.671:7830 '53)

Shows that subject method, first applied by C. F. Weissacker in 1935, in general can explain certain basic laws governing the structure of the nuclei, namely, the approximate constancy of energy and size in one nucleon, which will permit one at least to obtain approximate numerical values for some presently unknown constants relating to nuclear forces. Acknowledges helpful discussions of Ya. B. Zel'dovich and V. L. Ginzburg. Presented by Acad. N. N. Semenov 14 May 52. 252TSL

KOMPANEYETS, A.S.

VOYEVODSKIY, V.V.; KOMPANEYETS, A.S.

On N.S. Akulov's article; "Theory of chain reaction in the  
calculation of diffusion of active centers." Zhur. eksp. i teor.  
fiz. 25 no.3:379-380 S '53. (MLRA 7:10)  
(Chemical reactions) (Akulov, N.S.)

MINI-PANNELS. N.S.

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-assuming the 2-particle interaction to contain, in

ZEL'DOVICH, Yakov Borisovich; KOMPANEYETS, Aleksandr Solomonovich;  
SHUTOV, S.N., redaktor; AKHILAMOV, S.M., tekhnicheskiy redaktor.

[Theory of detonation] Teoriia detonatsii. Moskva, Gos.izd-vo  
tekhniko-teoret.lit-ry, 1955. 268 p. (MLBA 8:9)  
(Explosions)

KOMPANETS, Aleksandr Solomonovich; GRIGOROVA, V.A., redaktor; GAVRILOV,  
S.B., ~~tekhnicheskii~~ redaktor

[Theoretical physics] Teoreticheskaya fizika. Moskva, Gos. izd-vo  
tekhniko-teoret. lit-ry, 1955. 532 p. (MLRA 8:8)  
(Physics)



KOMPANEYETS, A. S.  
USSR/Physics - Resonators

FD-3119

Card 1/1 Pub. 153 - 18/24

Author : Kompaneyets, A. S.; Sayasov, Yu. S.

Title : Theory of electromagnetic resonators that are close in shape to conical

Periodical : Zhur. tekhn. fiz., 25, No 6 (June), 1955, 1124-1131

Abstract : The authors investigate the oscillations of electrical type in an electro-magnetic resonator formed from a spheroid and from a two-branch hyperbola cofocal with the spheroid in case of small ratios of focal distance to wave length. He modifies the ordinary method of the theory of perturbations so that consideration is taken of the strong deviation of the field in the resonator of the studied type from the field in the conical resonator close to the apices of cones. That is, the authors' aim is the strict investigation of the so-called spheroidal resonator under the assumption that the gap (the interval between the vertices of the hyperboloids) is sufficiently small. Five references, including one USSR: L. M. Ryzhik and I. S. Gradshteyn, Tablitsy integralov, GTTI, 1951.

Institution :

Submitted : April 3, 1954

Kompaneys, A. S.  
USSR/Physics ✓ Scattering

FD-1806

Card 1/1 Pub. 146 4/25

Author : Kompaneys, A. S.

Title : Multiple scattering in a Coulomb field in very thin layers of a substance

Periodical : Zhur. eksp. i teor, fiz. 28, 308-311, March 1955

Abstract : The author presents data on multiple Coulomb scattering in layers of a substance with optical thickness equal to 1 and 3. He explains the relative role of unit and multiple scattering for various angles of flight. In the supplement he discusses an optical model of Coulomb scattering in small angles. Five references, including: A. S. Kompaneys, ibid, 15, 236, 1945; 17, 1059, 1947.

Institution: Moscow Engineering Physics Institute

Submitted : March 17, 1954

KOMPANEETZ, A.C., SEMENOV, N.N., ZEIMANOV, I.L., STEPANOV, D.M., SHMETEL, D.K.  
(U.S.S.R.)

Some consideration on the operation<sup>o</sup>  
of high current linear accelerators

CERN-Symposium on High Energy Accelerators and  
Pion Physics

Geneva 11-23 June 56  
In Branch #5

KOMPANEYETS, A.S.

Category : USSR / Radio Physics, Radiation of Radio Waves, Trans-  
mission Lines and Antennas I-5

Abs Jour : Ref Zhur - Fizika No 3, 1957, No 7296

Author : Kompaneyets, A.S., Sayasov, Yu. S.

Title : Effect of Small Irregularities in the Shape of A Volume on  
the Natural Electromagnetic Oscillations in Closed Volumes

Orig Pub : Tr. 3-go Vses. matem. S"yezda, 2-M, AN SSSR, 1956, 161-162

Abstract : Brief description of previously published works (See Referat Zhurnal Fizika, 1964, 945; 1955, 3259; 1956, 8112, 8131).

Card : 1/1

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KOMPANEYETS, A. S.

USSR/Nuclear Physics - Instruments and Installations. Methods of Measurement and Investigation

C-2

Abst Journal : Referat Zhur - Fizika, No 12, 1956, 33827

Author : KOMPANEYETS, A. S.

Institution : Kobe University, Kobe, Japan

Title : Buncher Theory

Original

Periodical : Zhur. Tekhn. Fiziki, 1956, 26, No 3, 678-682

Abstract : Examination of the operation of a device for converting a continuous beam of charged particles into an aggregate of consecutive clusters. It is assumed that a narrow slit, in which a high-frequency longitudinal electric field is acting, is used as such a buncher. Theoretical calculations are carried out to clarify the effect of the large space charge on the operation of the buncher. It is shown that in that case when the buncher is used as the input section of a linear resonant accelerator, the effect of the space charge manifests itself favorably on the capture of the particles in the acceleration phase, so that it leads to a reduction in the spatial dispersion of the particle velocities.

Card 1/1

KOMPANEYETS, A. S.

APPROVED FOR RELEASE: 06/13/2000

CARD 1 / 2

PA 1650

CIA-RDP86-00513R000824120015-8

SUBJECT

USSR / Physics

AUTHOR

KOMPANEYETS, A. S., PAVLOVSKIY, E. S.

TITLE

The Equations of the Self-Consistent Field in an Atom.

PERIODICAL

Zhurn. eksp. i teor. fis., 31, fasc. 3, 427 - 438 (1956)

Issued: 12 / 1956

By means of FOCK's method of the self-consistent field the THOMAS - FERMI equations for the potential in an atom with all corrections of the order  $Z^{-2/3}$  are here obtained.  $Z$  denotes the nuclear charge number of the element.

The equations for the density matrix: The energy integral is before variation reduced to the form  $H = \sum U(q_i) + (1/2) \sum V(q_i, q_j)$ . This HAMILTONIAN contains only terms which belong to individual electrons and to their pair-wise interactions, and  $V$  is symmetric with respect to the variables.  $U$  denotes the sum of the kinetic and potential energy of the electron in the field of the nucleus and  $V$  - the energy of the electrostatic interaction of electrons. By variation and some transformations the following system for the required wave function  $\psi_i$  is obtained:  $U(q)\psi_i(q) + B(q)\psi_i(q) - \sum_k B_{ik}(q)\psi_k(q) + \sum_k a_{ik}\psi_k(q) = 0$

This equation is then transformed several times.

There follows transition to quasi-classical approximation: Here the matrix elements  $q(x, x')$  and  $H(x, x')$  are developed in a series of Fourier integrals according to the difference of the arguments  $x - x'$ . Attention is in this case restricted to the third term of the separation which is explicitly written down. After putting the FOURRIER coefficient zero and integrating with respect to parts, we obtain a tensorial equation for  $H$ . Here two terms represent the classical POISSON parenthesis of the FOURRIER

KOMPANEYETS, A.S.

SUBJECT USSR / PHYSICS CARD 1 / 2 PA - 1969  
 AUTHOR KOMPANEETS, A.S.  
 TITLE On the Development of Thermal Equilibrium between Quanta and Electrons.  
 PERIODICAL Zhurn.eksp.i teor.fis, 31, fasc.5, 876-885 (1956)  
 Issued: 1 / 1957

The present paper investigates the influence exercised by the COMPTON effect on the thermal equilibrium between quanta and electrons in nonrelativistic approximation.

At first the kinetic equation for the distribution function  $n$  of the quanta in an unlimited medium is written down on which occasion only scattering is taken into account. This equation has the following form:

$(\partial n / \partial t)_C = - \int d\tau \left[ n(1+n')N(\xi) - n'(1+n)N(\xi + h\omega - h\omega') \right] dW$ . Here  $N$  denotes the distribution function of the free electrons,  $d\tau$  - the element of the phase volume of the electrons,  $dW$  - the differential probability of transition from the given state into another, which agrees with the laws of conservation for energy and momentum. The index  $C$  at  $\partial n / \partial t$  indicates that only the COMPTON processes are taken into account in the equation. The statistical equilibrium between the electrons in the plasma occurs very rapidly independent of radiation and therefore the distribution function  $N(\xi)$  must be considered to be MAXWELL-like. The energy of the electrons is here considered to be nonrelativistic, i.e. it holds that  $kT \ll mc^2$ . Then the energy transferred on the occasion of

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CIA-RDP86-00513R000824120015-8

Zhurn.eksp.i teor.fis, 31, fasc.5, 876-885 (1956) CARD 2 / 2 PA - 1969

each individual act is low as compared with the energy of the quantum:

$\omega' - \omega = \Delta \ll \omega$ . In consideration of this inequation the integral expression of the above equation is developed into a number of powers from  $\Delta$  up to and including the second power. Next, the laws of conservation for momentum and energy are written down in nonrelativistic approximation. The kinetic equation is then several times transformed and linearized.

The slowing down spectrum: The spectrum of bremsstrahlung is, on the whole, of a complicated character. Here such conditions are presupposed as make it possible to make use of BORN'S approximation for the purpose of determining the spectrum. These conditions are satisfied in the case of light elements at sufficiently high temperatures. Besides,  $kT \ll mc^2$  shall hold good. The scattering of electrons by electrons is here not taken into consideration. The slowing down cross section holding good in this case is written down. The relaxation time of thermal equilibrium in the case of a pure slowing down mechanism is  $\tau_B = \tau_B^0 / (e^{h\omega/kT} - 1)$ .

Next, the total kinetic equation is written down which takes COMPTON processes and slowing down processes into account. Next, the convection of energy from the electrons to the quanta by pure slowing down- and by pure COMPTON mechanisms is discussed. In conclusion the general formulae for the average frequency in a COMPTON process are derived. An appendix deals with the process in a body with finite dimensions.

INSTITUTION: Institute for Chemical Physics of the Academy of Science in the USSR.

Kompaneets, A. S. The similarity problem in the development of a shock wave from a compression wave  
Dokl. Akad. Nauk SSSR (N 5) 107 (1972) 1001  
(Russian)

The self-similar, one-dimensional gas is considered, resulting from initial conditions

$$p_0 = B \tau^0 (x \geq 0), \quad p_0 = \text{const}$$

$$p_0 = 0 (x < 0), \quad t_0 = 0$$

of the gas. Here  $x$  denotes distance,  $p$  is the pressure, density and velocity respectively,  $\tau$  is the time parameter. The physical variables have the form

$$p = p_0 \frac{x^2}{t^2} / (1 + \frac{1}{2} \frac{x}{t}), \quad p = p_0 \eta \tau$$

where

$$\eta = \left( \frac{B}{p_0} \right)^{1/(3-\alpha)} \frac{p_0 \tau^{\alpha}}{x} = \left( \frac{B}{p_0} \right)^{1/(3-\alpha)} \frac{1}{x}$$

In the Eulerian equations of motion a differential equation of the first order may be obtained to determine  $\eta$  as a function of  $\eta$  when  $\eta = 0$ . The solutions of this equation are calculated and the values of the variables at the points  $\eta_1, \eta_2$  and  $\eta_3$  are determined.

1. PW

KOMPANEYETS, A.S.

SUBJECT USSR / PHYSICS  
 AUTHOR KOMPANEEC, A.S.  
 TITLE The Shock Waves in a Plastically Compressible Medium.  
 PERIODICAL Dokl. Akad. Nauk, 109, fasc. 1, 49-52 (1956)  
 Issued: 9 / 1956 reviewed: 10 / 1956

CARD 1 / 2

PA - 1426

Here the shocklike propagation of a plastic deformation in a medium with the following properties is investigated: In the initial state it has the density  $\rho_0$ , and with this density it offers a negligibly small resistance to compressions. The medium which attains the density  $\rho_1$  is incompressible and in this state it is plastic. The absolute value of the highest tangential tension is, in this case, supposed to depend on the average vertical tension (plasticity condition by PRANDTL). Such a plasticity exists, for example, in sand. The shock wave is produced as a result of an explosion in a certain and rather small spherical space with the radius  $R_0$ . The main axes of the tension tensor are identical with the coordinate lines of a spherical system the center of which is in the center of the explosion. The principal vertical tensions are here called  $\sigma_r$  and  $\sigma_\theta = \sigma_\varphi$ . The condition of plasticity is  $\sigma_r - \sigma_\theta = k + m(\sigma_r + 2\sigma_\theta)$ . Next, the equations of motion of the compressed medium are written down and herefrom an expression for  $\sigma_r$  is derived. Also the boundary conditions for the front of the shock wave are explicitly given. On the boundary of the widening cavity pressure must be put equal to negative vertical tension:  $p = -\sigma_r(R_0)$ . The radius of the cavity can easily be determined from the constance of mass, and we finally find:

INSTITUTION: Institute for Chemical Physics of the Academy of Science in the USSR

APPROVED FOR RELEASE: 06/13/2000

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KOMPANEYETS, Aleksandr Solomonovich

~~KOMPANEYETS, Aleksandr Solomonovich; RATNER, S.B., redaktor; TUMARKINA, N.A.,  
tekhnicheskii redaktor~~

[Theoretical physics] Teoreticheskaya fizika. Izd. 2-oe, perer.  
i dop. Moskva, Gos.izd-vo tekhniko-teoret. lit-ry, 1957. 563 p.  
(Physics) (MLRA 10:9)

Kompaneets, A. S.; and Pavlovskii, E. S. The self-consistent field equations in an atom. Phys. U.S.S.R. 1967, 18, 103.

JETP 4 (1957) 320-324

Following a method first proposed by G. I. Buzdakov and A. I. Dmitriyev, the Hamiltonian is derived in a form that is convenient for solving the two-particle test field equations, which are solved in the form of a series in the matrix  $\mathbf{A}$ . A suitable form of the commutator  $[\mathbf{A}, \mathbf{H}]$  is chosen, and the commutator is expanded in terms of the matrix  $\mathbf{A}$ . The first-order commutator is the quadratic form  $\mathbf{A}^2$ , and the second-order commutator is the quadratic form  $\mathbf{A}^2$  plus the Thomas term  $\mathbf{A}^3$ . The first correction to order  $\mathbf{A}^2$  is the Thomas term  $\mathbf{A}^3$ , and the second correction to order  $\mathbf{A}^2$  is the Thomas term  $\mathbf{A}^3$ . The well-known result is obtained.

BY LARA AND CIP Lee will be a good friend.

KOMPANEYETS, A. S. (Moscow, USSR)

Application de la methode de champ self-consistant aux noyaux atomiques.

report presented at the Intl. Congress for Nuclear Interactions (Low Energy)  
and Nuclear Structure (Intl. Union Pure and Applied Physics) Paris, 7-12 July 1958.

KOMPANEYETS, A.S., doktor fiz.-mat.nauk

Relativity and gravity. Znan.sila 33 no.12:14-18 D '58.

(MIRA 11:12)

(Relativity (Physics)) (Gravitation)

AUTHOR: Kompaneys, A. S. 56-34-4-26/60

TITLE: Strong Gravitation Waves in the Empty Space (Sil'nyye gravitacionnyye volny v pustote)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 4, pp. 953 - 955 (USSR)

ABSTRACT: This work generalizes the results by A. Einstein and N. Rosen (Reference 1) to the case of two gravitation waves which are in interaction. Einstein and Rosen showed that the equation of the propagation of a strong gravitation wave (which in passing to the limit corresponds to a weak transverse-transverse wave of the form  $g_{22}-g_{33}$ ) leads to a linear propagation equation of the cylindric wave. It can be shown that also a more general form of a strong gravitation wave (which in passing to the limit corresponds to a superposition of waves of the form  $g_{22}-g_{33}$  and  $g_{23}$ ) permits very similar generalizations. The author starts with a line element of the shape

$$-ds^2 = A dx_1^2 + C dx_2^2 + 2B dx_2 dx_3 + D dx_3^2 - A dx_4^2.$$

On this occasion A, B, C, D depend only on  $x_1$  and  $x_4$  which in passing to the limit

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Strong Gravitation Waves in the Empty Space

56-34-4-26/60

corresponds to a plane wave. The coordinates  $x_1$  and  $x_4$  are chosen so that  $g_{11} = -g_{44}$ ,  $g_{14} = 0$  is valid. The Christoffel symbols of the second kind, which result in this case, are written down explicitly. A part of these Christoffel symbols is equal to zero. Only the components  $R_{11}, R_{14}, R_{44}, R_{22}, R_{33}, R_{23}$  of the contracted tensor of curvature are different from zero. This gives six equations for the quantities A, B, C, D and therefore the compatibility of these terms must be proved. This is made in this work under special choice of the system of coordinates. The choice of the system of coordinates was already subjected to the conditions  $g_{11} = -g_{44}$  and  $g_{14} = 0$ . The remaining 2 conditions are in the 2 remaining equations (over the 4 necessary equations). First the equations  $R_{ik} = 0$  for the components 2 and 3 are written down. Then the compatibility of the whole system of the gravitation equations for the chosen parameters is proved. Though the system ascertained here of the hyperbolic equations is not linear their characteristics are the lines  $x_1 = \pm x_4$ .

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Therefore also strong gravitation waves, similar to the weak

Strong Gravitation Waves in the Empty Space

56-34-4-26/60

waves, propagate with light velocity. Besides the characteristics of each family do not intersect. Therefore the nonlinear hyperbolic equations of the gravitation do not cause the necessity of the production of shock waves. This makes these equations differ, for instance, from the equations of gas dynamics, which belong to the same class. The occurring of shock waves would disagree with the Riemann character of metrics. Thus the investigation made shows once again the internal agreement of the Einstein equations of the field of gravitation. Finally the author thanks V. L. Ginzburg for the indication of the most important literature sources. There are 2 references, 1 of which is Soviet.

ASSOCIATION: Institut khimicheskoy fiziki (Institute of Chemical Physics)

SUBMITTED: November 11, 1957

Card 3/3

1. Gravity---Mathematical analysis

SOV/56-34-5-33/61

AUTHORS: Zel'dovich, Ya. B., Kompaneysa, A. S., Rayzer, Yu. P.

TITLE: On Radiation Cooling of Air. I. (Ob okhlazhdenii vozdukha izlucheniye. I) General Description of the Phenomenon and the Weak Cooling Wave (Obshchaya kartina yavleniya i slabaya volna okhlazhdeniya)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol. 34, Nr 5, pp. 1278-1287 (USSR)

ABSTRACT: This paper discusses the approximation theory of the cooling wave and the fact is established that in this layer the temperature abruptly decreases from the initial value to the "temperature of transparency"  $T_2$ . A diagram shows the successive changes of the temperature distributions, by taking adiabatic cooling into account. The authors try to find the solution of the nonsteady equations of the radiating heat exchange. These solutions have the form  $T(x - ut)$  and correspond to a plane wave propagated with the constant velocity in the gas at the given temperature  $T_1$  and with the density  $\rho_1$ . But these equations are not solved by exact solutions of the kind

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SOV/56-34-5-33/61

On Radiation Cooling of Air. I. General Description of the Phenomenon and the Weak Cooling Wave

$T(x - ut)$ . The causes of this fact are discussed. If the cooling wave propagates in expanding air, adiabatic cooling transports the air layers, which were cooled by the radiation into a region of temperatures so low that they become practically transparent. The authors do not investigate the additional absorption of the light at low temperatures due to oxide and dioxide of nitrogen produced in the heated air. Moreover, the intense molecular absorption at low temperatures (which is essential for the ultraviolet radiation with  $2000 \text{ \AA}$ ) is neglected. There are two ways of taking the real facts into account. First, it is possible to introduce an additional constant term  $A$  (which characterizes adiabatic cooling) into the energy equation. Secondly, it is possible to exclude from the investigation the weakly absorbing gas region which is cooled below the temperature of transparency. In order to determine the radiation flux, the authors apply the diffusion approximation to the exact kinetic equation which takes into account the angular distribution of the radiation in an approximate manner. In a great part of the cooling wave the true radiation density  $U$  is very similar to its equilibrium value  $U_p$ . In the region with cooled air,

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On Radiation Cooling of Air. I. General Description of the Phenomenon and the Weak Cooling Wave

SOV/56-34-5-33/61

however,  $U$  is very different from  $U_p$ . Lastly, the authors calculate the special case where  $T_p$  is only a little higher than  $T_2$ . In this case it is possible to find the exact analytical solution of this problem. There are 5 figures, 1 table, and 6 references, 5 of which are Soviet.

ASSOCIATION: Institut Khimicheskoy Fiziki (Institute of Chemical Physics)

SUBMITTED: December 20, 1957

1. Air—Cooling    2. Heat transfer—Theory    3. Mathematics  
—Applications

Card 3/3

AUTHORS: Zel'dovich, Ya.B., Kompaneys, A. S., SOV/56-34-6-11/51  
Rayzer, Yu. P.

TITLE: On Air Cooling by Radiation (Ob okhlazhdenii vozdukha  
izlucheniye )

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958,  
Vol 34, Nr 6, pp 1447 - 1454 (USSR)

ABSTRACT: The first part of this investigation discussed the cooling  
of a great volume of heated air in a qualitative manner,  
it dealt with weak cooling waves. This paper, however, deals  
with the theory of a strong cooling wave in which the  
higher temperature may be infinitely high. This paper has  
to determine the radiation flux which moves from the  
front of the cooling wave towards infinity and to obtain  
the temperature distribution on front of the cooling  
wave. One of the following two methods has to be used:  
either to introduce a constant term into the energy equation  
or to determine from the very beginning the "transparency  
temperature"  $T_2$  according to a formula given in the first  
part of this investigation. In the latter case one has

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On Air Cooling by Radiation

SOV/56-34-6-11/51

to assume that the air is absolutely transparent for  $T < T_2$ . The first method gives a more complete description of the temperature distribution because it allows to investigate the change of the temperature in the cooled air and to take into account the absorption of the light in the air. But this method leads to unnecessary mathematical complications at temperatures above the transparency temperature. It is more advantageous to investigate the internal structure of the cooling wave according to the second method; the corresponding energy equation is given explicitly. The authors investigate the lower part of the cooling wave where the temperatures are similar to  $T_2$ . At the lower boundary of the cooling wave the density of the radiation is lower than the equilibrium density. Regardless of the amplitude of the cooling wave always the lower boundary of the cooling wave radiates, even at extremely high temperatures. This conclusion follows from the steadiness of the profile of the cooling wave. The second part of this paper calculates the distribution of the temperature in the cooling wave and the last part of this paper deals with the lower margin of the cooling wave and with the transition

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On Air Cooling by Radiation

SOV/56-34-6-11/51

of the cooled air to the transparent zone. The processes taking place in the cooled air zone are essentially instationary and depend on the dimensions, on the hydrodynamic motions, and on the additional mechanisms of light absorption. The authors then investigate the practically important case where the air pressure had not yet decreased to the atmospheric pressure and where the air continues to get cooler by radiation. The processes with adiabatic cooling are quasistationary processes in the whole interesting region. The point where the cooling of the air by radiation ends may be considered as the lower boundary of the cooling wave and the temperature in it - as the transparency temperature for a given value  $A$  of the adiabatic cooling. The transparency temperature depends only logarithmically on  $A$  and on the amplitude of the cooling wave. The authors thank N.N. Semenov for his stimulating discussions. There are 5 figures and 2 references, 2 of which are Soviet.

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On Air Cooling by Radiation

SOV/56-34-6-11/51

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute  
for Chemical Physics, AS USSR)

SUBMITTED: December 20, 1957

Card 4/4

2(5), 7(7)

SOV/56-35-6-33/44

AUTHOR: Kompaneyets, A. S.

TITLE: Radio Emission in an Atomic Explosion (Radioizlucheniye atomnogo vzryva)

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1958, Vol 35, Nr 6, pp 1538-1544 (USSR)

ABSTRACT: G. M. Gandel'man and L. P. Feoktistov investigated the manner in which an electromagnetic field can be produced in air under the influence of  $\gamma$ -quanta. They suggested the following scheme: The quanta knock out Compton (Kompton)-electrons which, on their flight, produce a large number of secondary electrons; the latter render the air conductive, and in this way a current is produced which endeavors to annihilate the existing field. If emission of the  $\gamma$ -quanta is asymmetric, the current emits an electromagnetic pulse of the duration of one or several microseconds, i.e. radiowaves in the meter range. O. I. Leypunskiy pointed out the origin of oscillations of longer waves. The electrons do not unite with positive ions but mainly with neutral  $O_2$ -molecules, so that the air acquires ionic conductivity. An asymmetric ion current leads, as the calculations in the present paper show, to radio pulses of

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Radio Emission in an Atomic Explosion

SOV/56-35-6-33/44

a sensible order of magnitude with expected duration. The primary field is first investigated; multiple scatterings of quanta are not taken into consideration as being effects of second order. The results obtained by the author agree with the estimates made by Leypunskiy. In the second part of the paper the electromagnetic oscillations are investigated. It was found that the duration of the vibrations in each half wave is of the order of 2 microseconds, and for equal asymmetry of gamma emission the amplitude of vibrations depends only weakly on total emission. The author finally thanks O. I. Leypunskiy, who pointed out the part played by the ionic conductivity of air in connection with the production of radio signals, and who stimulated work by his discussions. He further thanks A. A. Milyutin, S. L. Kamenomostskaya and V. I. Kozhevnikov for carrying out calculations, and finally, also A. A. Dorodnitsyn, and M. V. Keldysh, who placed the computer at his disposal. There are 1 figure and 2 Soviet references.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR  
Card 2/3 (Institute for Chemical Physics of the Academy of Sciences, USSR)

KOMPANEYET A.S

**21 (0), 24 (0)**

**Тяжело, О. А.**

# ATTN

## PERIODICALS

## ABSTRACT

SC 7/09-7-2-18/24

Scientific Conference of the XXVI Nauchnaya Konferentsiya NIPPI

*Atomnaya energiya*, 1959, vol 7, nr 2, pp 176-177 (1959)

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Case 1/3

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Card 2/3

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9(3)

SOV/25-59-9-8/49

AUTHORS: Kompaneyets, A.S. (Moscow), Doctor of Physico-Mathematical Sciences; Kaganov, M.I. (Khar'kov), Candidate of Physico-Mathematical Sciences

TITLE: Electrical Conductivity

PERIODICAL: Nauka i zhizn', 1959, Nr 9, pp 24 - 29 (USSR)

ABSTRACT: The editor refers to the lecture "The 21st Congress of the CP USSR and the Tasks of Science" presented by the vice-president of the AS USSR, A.V. Topchiyev, at the general yearly assembly of the AS USSR. A.V. Topchiyev stated that the development of new and improved devices and apparatuses, using semi-conductors, e.g. diodes, triodes, rectifiers, photo- and thermogenerators, refrigerators for technical and private needs, is a most important task. The authors of the present article give general explanations of the fundamental principles of electrical conductivity. By means of an example with two elements - helium and lithium - they prove that crystals of a compact for-

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Electrical Conductivity

SOV/25-59-9-8/49

mation are dielectrics and that those of loose formation are conductors. Besides metals, there exists still another class of crystal electronic conductors e.g. elements of silicon, germanium and selenium. Their electrical conductivity is much lower than that of metals and therefore they are called semi-conductors. There are 9 diagrams and 1 drawing.

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16.8100, 16.8300

76988  
SOV/56-37-6-28/55

AUTHOR: ~~Kompaneets, A. S.~~

TITLE: Propagation of a Strong Electromagnetic-Gravitational  
Wave in Vacuum

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki,  
1959, Vol 37, Nr 6, pp 1722-1726 (USSR)

ABSTRACT: A theoretical analysis showed that a strong electro-  
magnetic-gravitational wave possesses a system  
of rectilinear and parallel characteristics, and  
therefore the velocity of the propagation of any  
small addition perturbation will always be equal  
to that of light. It thus cannot be expected  
that there exist solutions with a Euclidean metric  
at infinity that can differ qualitatively from the  
ordinary electromagnetic waves in finite spatial  
regions. The propagation of the wave was described  
by the matrix:

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Propagation of a Strong Electromagnetic-  
Gravitational Wave in Vacuum

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SOV/56-37-6-28/55

$$-ds^2 = Adx_1^2 + Cdx_2^2 + 2Bdx_2dx_3 + Ddx_3^2 - Adx_4^2, \quad (1)$$

(cf. A. S. Kompaneets, Zhur. eksp. i teoret. fiz., 34, 953, 1958). The coefficients A, B, C, D were considered as the functions only from  $x_1$  and  $x_4$ .

The Maxwell equation for the contravariant components of the electromagnetic field had the following form:

$$\frac{\partial}{\partial x_1} (F^{14} \sqrt{-g}) = 0, \quad (2a)$$

$$\frac{\partial}{\partial x_1} (F^{21} \sqrt{-g}) + \frac{\partial}{\partial x_4} (F^{24} \sqrt{-g}) = 0, \quad (2b)$$

$$\frac{\partial}{\partial x_1} (F^{31} \sqrt{-g}) + \frac{\partial}{\partial x_4} (F^{34} \sqrt{-g}) = 0, \quad (2b)$$

$$\frac{\partial}{\partial x_1} (F^{41} \sqrt{-g}) = 0. \quad (2r)$$

The tensor component of the energy-momentum from these relations was:

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Propagation of a Strong Electromagnetic -  
Gravitational Wave in Vacuum

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$$T_{11} = T_{44} = \frac{1}{2} (F_{12}F_1^2 + F_{13}F_1^3 + F_{42}F_4^2 + F_{43}F_4^3). \quad (3)$$

The expansion of these relations gave the following wave equations for the electromagnetic field:

$$\begin{aligned} \frac{1}{x_1} \frac{\partial}{\partial x_1} x_1 F_1^3 - \frac{\partial F_4^3}{\partial x_1} &= 0, & \frac{1}{x_1} \frac{\partial}{\partial x_1} x_1 F_1^4 - \frac{\partial F_4^4}{\partial x_1} &= 0; \\ \frac{\partial}{\partial x_1} C F_1^3 + \frac{\partial}{\partial x_1} B F_1^3 - \frac{\partial}{\partial x_1} C F_4^2 - \frac{\partial}{\partial x_1} B F_4^3 &= 0, \\ \frac{\partial}{\partial x_1} B F_1^3 + \frac{\partial}{\partial x_1} D F_1^3 - \frac{\partial}{\partial x_1} B F_4^2 - \frac{\partial}{\partial x_1} D F_4^3 &= 0. \end{aligned} \quad (14)$$

Based on these results, it is doubtful that the so-called "geons" exist, as proposed by A. Wheeler (cf. Phys. Rev., 97, 1511, 1955). Similarly, the predictions of Wheeler (cf. Ann. Phys., 2, 525, 1957) that the existence or the absence of charges is due to the topological link of the space appears

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Propagation of a Strong Electromagnetic-  
Gravitational Wave in Vacuum

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to have no ground. There are 7 references, 3 Soviet,  
1 German, 3 U.S. The U.S. references are: A. Wheeler.  
Ann. of Phys. 2, 525 (1957); A. Einstein, N. Rosen,  
Journ. of Franklin Inst., 223, 43, (1937); A. Wheeler.  
Phys. Rev., 97, 1511 (1955).

ASSOCIATION: Inst. Chem. Phys. Acad. Sciences USSR, USSR (Institut  
khimicheskoy fiziki Akademii nauk SSSR, SSSR)

SUBMITTED: July 1, 1959

Card 4/4

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66413

SOV/20-128-6-17/63

AUTHOR: Kompaneyets, A. S.

TITLE: Influence of a Space Charge on Autoelectron Emission

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 6, pp 1160-1162 (USSR)

ABSTRACT:

Current densities of the order of magnitude  $10^7$  a/cm<sup>2</sup> are obtained today in experiments of autoelectron emission. With such current densities the space charge field is of the same order of magnitude as the field computed from the total potential difference and from the geometrical configuration of the device which is actually rather spherical than plane. An exact solution of the problem of spherical diodes was supplied by V. L. Kan (Ref 2), and was extended by R. P. Poplavskiy (Ref 3) to the case in which the field strength on the cathode is not equal to zero. The solution by Kan and Poplavskiy may be represented in a parametric form as follows:

$$\frac{R}{r} = x^{4/3} y^{2/3} \left[ I_{1/3}(y) K_{-2/3}(x) + K_{1/3}(y) I_{-2/3}(x) \right]^2$$

$$\frac{V}{(k'J)^{2/3}} = y^{2/3} \left[ \frac{I_{-2/3}(y) K_{-2/3}(x) - K_{-2/3}(y) I_{-2/3}(x)^2}{I_{1/3}(y) K_{-2/3}(x) + K_{1/3}(y) I_{-2/3}(x)} \right];$$

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Influence of a Space Charge on Autoelectron Emission

SOV/20-128-6-17/63

function, say, equal to  $w = 4.6$  ev. On the assumptions made here it follows that  $j = 1.29 \cdot 10^{16}$  CGSE and  $V = 75.4$  CGSE. Without considering the space charge one would obtain  $V = 66.7$  CGSE, so that the space charge is increased by the potential difference by 13%. A completely different result is obtained for a plane diode. With  $d = R$  one obtains  $\alpha = 1.83$  and  $v = 2.88$ . This corresponds to an almost treble increase of the potential. For large current densities, many authors recommend the introduction of a correction for the mapping force. The problem dealt with here is reduced to the simultaneous solution of a Schroedinger equation and a Poisson equation, and no classic mapping force can be contained in the potential  $\phi$ . The influence of the space charge not surpassing the barrier is of the second order with respect to the total penetrability. A formula is written down for the penetrability of the barrier. The author thanks G. N. Shuppe for pointing to the problem under review, Ya. B. Zel'dovich for an important discussion of results, and Yu. S. Sayasov and G. A. Grinberg for their indications concerning the solvability of the problem for a spherical diode, and for reference to publications. There are 6 references, 5 of which are

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APPROVED FOR RELEASE: 06/13/2000

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Influence of a Space Charge on Autoelectron Emission

SOV/20-128-6-17/63

Soviet.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences, USSR)

PRESENTED: June 18, 1959, by V. N. Kondrat'yev, Academician

SUBMITTED: June 15, 1959

Card 4/4



KOMPANEYETS, A.S.

Effect of volume charge on the electrostatic emission of  
electrons from a metal. Trudy SAGU no.148:117-125 '59.

(MIRA 13:7)

(Electric fields) (Electron emission)

KOMPANEYETS, A.S.

Propagation of a strong electromagnetic gravitational wave in  
a vacuum. Zhur. eksp. i teor. fiz. 37 no. 6: 1722-1726 D '59.  
(MIRA 14:10)

1. Institut khimicheskoy fiziki AN SSSR.  
(Electromagnetic waves) (Gravitation)

KOMPANEYETS, A

9

Theory of detonation, <sup>by</sup> Ya. B. Zeldovich and A.S. Kompaneyets. New York and London, Academic Press, 1960.

264 p. Diagr.s., Graphs.

Translated from the original Russian: Teoriya detonatsii, Moscow, 1955.

KOMPANEYETS, A.S.

12 12"  
"On the Bond in the Nuclear Molecule C -C "

report submitted for the 2nd USSR Conference on Nuclear Reactions at Low and Intermediate Energies, Moscow, 21-28 July 1960.

S/109/60/005/008/017/024  
E140/E355

9,3140 (2301,1003,1140)

AUTHOR: Kompaneyets, A.S.

TITLE: The Effect of Space Charge on Field Emission

PERIODICAL: Radiotekhnika i elektronika, 1960, Vol. 5,  
No. 8, pp. 1315 - 1317

TEXT: This purely theoretical note indicates that the image forces employed in calculating the potential behind a barrier, required by classical theory, are incompatible with a quantum mechanical approach. The potential behind the barrier is determined from the Poisson equation by the method of self-matched fields, the solution being valid for all cases where the transparency factor is greater than unity. There are 4 references: 2 Soviet and 2 non-Soviet.

SUBMITTED: December 21, 1959

Card 1/1

88446

S/056/60/039/006/038/063  
B006/B063

24.6/00

AUTHOR:

Kompaneyets, A. S.

TITLE:

The Bond in the  $C^{12} - C^{12}$  Nuclear Molecule

PERIODICAL:

Zhurnal eksperimental'noy i teoreticheskoy fiziki, 1960,  
Vol. 39, No. 6(12), pp. 1713 - 1715

TEXT: Recent C-C scattering experiments indicated the existence of resonance quasi-levels which are ascribed to a "molecular" state with a lifetime in the order of  $10^{-21}$  sec. The author has now made a theoretical study of this problem, which shows that quasi-stable states of two nuclei can exist at nuclear distances larger than the diameters of the peripheral nuclear zone. The bond in this quasi-molecule is ascribed to the orbit of a strongly excited neutron, which the two nuclei have in common. If the energy of this neutron is close to the ejection threshold, then the wave function outside the nucleus is attenuated at distances that are greater than the radius of action of the nuclear forces. Calculations have shown that the force resulting from

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The Bond in the  $C^{12} - C^{12}$  Nuclear Molecule

S/056/60/039/006/038/063  
B006/B063

case the probability of neutron excitation is less than in the case of  $C^{12}$ . A. S. Davydov and K. A. Ter-Martirosyan are mentioned. There are 3 references: 1 Soviet, 1 US, and 1 Dutch.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics, Academy of Sciences USSR)

SUBMITTED: June 13, 1960 (initially) and August 31, 1960 (after revision)

Card 3/3

68604

70.2000

10(6)

S/020/60/130/05/013/061  
B013/B014

AUTHOR:

Kompaneyskiy, A. S.

TITLE:

A Point Explosion in an Inhomogeneous Atmosphere

PERIODICAL:

Doklady Akademii nauk SSSR, 1960, Vol 130, Nr 5, pp 1001-1003 (USSR)

ABSTRACT:

The author solves the above-mentioned problem by a semiclassical method. The propagation of waves is described using the conditions which hold on the shock wave itself. Linearization is not permissible for an explosion in a strongly dilute atmosphere. The problem with three variables is very difficult to integrate. It is, however, possible to apply a semiclassical method which is based on the only essential singularity of the exact centrally symmetric solution. In the case of such a solution, energy is almost evenly distributed over the entire volume of the explosion wave, and only near the wave front it is two or three times as large as the value averaged over the entire volume. In this region also the entire mass of the substance is concentrated. Explosion waves in an inhomogeneous atmosphere are also assumed to have the same properties. If the pressure inside the wave is spatially constant, and if the mass density equals zero, the hydrodynamic equations in the main part of the

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68604

A Point Explosion in an Inhomogeneous Atmosphere

S/020/60/130/05/013/061  
B013/B014

volume are satisfied in a trivial manner. For the purpose of describing the wave propagation it is necessary to apply the conditions holding on the shock wave itself. In cylindrical coordinates, one obtains for the wave front the equation

$$\left(\frac{\partial r}{\partial y}\right)^2 - e^{-z/z_0} \left[ \left(\frac{\partial r}{\partial z}\right)^2 + 1 \right] = 0. \quad z_0 \text{ denotes the equivalent}$$

thickness of the atmosphere,  $y$  an auxiliary variable defined by

$$y = \int_0^t \frac{dt}{\sqrt{V}} \sqrt{\frac{\lambda E(\gamma^2 - 1)}{2\epsilon_0}}, \text{ and } \epsilon_0 = \text{the initial air density}$$

at the point of explosion ( $z = 0$ ). This differential equation is solved by separation of the variables. With small  $t$  and  $y$  one obtains

$$r = 2z_0 \arccos \left[ \frac{1}{2} e^{z/2z_0} (1 - x^2 + e^{-z/z_0}) \right], \text{ where}$$

$x = y/2z_0$  holds. For the positions of the highest and the lowest point  $z_1$  and  $z_2$  of the wave one obtains  $e^{-z_{1,2}/2z_0} = 1 \mp x$ .

For the position and the maximum radius of the wave one obtains

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KOMPANEYETS, Aleksandr Solomonov'ch; FAYNBOYM, I.B., red.; NAZAROVA, A.S.,  
tekhn. red.

[Space and time in the relativity theory] Prostranstvo i vremia v  
teorii otnositel'nosti. Moskva, Izd-vo "Znanie," 1961. 60 p. (Vse-  
soiuznoe obshchestvo po rasprostraneniю politicheskikh i nauchnykh  
znaniy. Ser.9, Fizika i khimiya, no.18/20) (MIRA 14:11)  
(Space and time) (Relativity (Physics))

IVANENKO, D.D., prof., doktor fiziko-matematicheskikh nauk; SHIROKOV, M.F.,  
prof., doktor fiziko-matematicheskikh nauk; GERTSENSHTEYN, M.Ye.,  
kand.fiziko-matematicheskikh nauk; KOMPANEYETS, A.S., prof.,  
doktor fiziko-matematicheskikh nauk

Do gravity waves exist? Znan. sila 36 no.12:6-7 D '61.  
(MIRA 15:1)

(Gravitation)

26716  
S/056/61/041/005/031/038  
B102/B138

26.5300

AUTHORS: Kompaneyets, A. S., Lantsburg, Ye. Ya.

TITLE: Heating of gas by radiation

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 41,  
no. 5(11), 1961, 1649 - 1654

TEXT: Radiative heat propagation from a hot region ( $T \sim 10^6$  OK) into a cold gas is investigated theoretically. An exact solution of the problem is only possible when the integral equation of the radiative heat transfer is solved. When, however, the range of radiation varies considerably with  $T$  the problem can be solved more simply.  $R$  is the size of the heated region. Then the temperature  $T_0$  at which the range  $l$  is of the order of  $R$  is given by  $l(T_0) = R$ ;  $T_0$  is only weakly dependent on  $R$  if  $l(T)$  is a strong function. The heated region is divided into two: an inner region which is so hot that it is transparent for radiation, and an outer one which is opaque and forms the boundary layer to the cold gas. It is assumed that the role of the inner region in the energy balance can be

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S/056/61/041/005/031/038  
B102/B138

Heating of gas by radiation

the energy balance equation. In diffusion approximation  $S = -\frac{1}{3} \text{grad} U / \partial x$ .  
The boundary conditions for these equations read as follows:  $T = T_0$ ,  
 $U = U_1$  and  $T = 0$ ,  $S = 0$ ,  $U = 0$ . With  $d\tau = dx/l(T)$  ( $x$  coincides with the  
temperature gradient) and

$$\begin{aligned} \gamma &= \frac{\sigma T_0^4}{\epsilon(T_0)}, \quad \beta = \frac{v}{c}, \quad u = \frac{U}{\sigma T_0^4} \left( \frac{\gamma}{\sqrt{3}\beta} \right)^{1/2}, \quad s = \frac{\sqrt{3}S}{\sigma T_0^4} \left( \frac{\gamma}{\sqrt{3}\beta} \right)^{1/2}, \\ u_1 &= \frac{U_1}{\sigma T_0^4} \left( \frac{\gamma}{\sqrt{3}\beta} \right)^{1/2}, \quad u_p = \left( \frac{\gamma}{T_0} \right)^{1/2} \left( \frac{\gamma}{\sqrt{3}\beta} \right)^{1/2}, \quad u_{p_0} = \left( \frac{\gamma}{\sqrt{3}\beta} \right)^{1/2}. \end{aligned} \quad (8)$$

Eq. (5) can be solved.  $s = u_p^{1/4} + \sqrt{3} \beta u$  and the ordinary differential

$$\text{equation } \frac{ds}{du} = \sqrt{3} \beta + \frac{u - u_p}{s} = \sqrt{3} \beta + \frac{u}{s} - \frac{(s - \sqrt{3} \beta u)^4}{s} \quad (10)$$

can be derived. The physically meaningful solutions, for which  $\beta = v/c \leq 1$ ,  
often require the inequality  $U \ll \epsilon$  to be satisfied. In this case Eq. (10)

changes into  $ds/du = \sqrt{3} \beta + u/s - s^3$  (11) with  $s = 0$  for  $u = 0$  and  $u = u_1$   
for  $u_p = u_{p_0}$ . Then the wave velocity can be found from  $s(u_1; \beta) = u_{p_0}^{1/4}$ ;  
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Heating of gas by radiation

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S/056/61/041/005/031/038  
B102/B138

this is demonstrated graphically. The results show that the true radiative energy density  $u$  is always greater than the equilibrium density  $u_p$ , which is a necessary condition for the propagation of a thermal wave. Integration of Eq. (11) is carried out for the following special cases: 1)  $(T_1 - T_0)/T_1 \ll 1$ , 2)  $T_1 \gg T_0$ , but  $U_1 \ll \varepsilon(T_0)$ , and 3)  $\beta \ll 1$ ,  $T_1/T_0$  is of the order of unity. For these three cases the solutions for  $\beta \ll 1$  read as

follows: (1):  $\beta = v/c = \frac{4}{3} \frac{\chi}{\sqrt{1+\chi}} \left( \frac{T - T_0}{T_1} \right)^{1/2}$ ; (2):  $\beta = U_1 / \sqrt{3} \varepsilon(T_0)$  and (3):  $\beta = v/c = \frac{1}{\sqrt{3}} \frac{\chi}{u_1^{3/4}} \left( \frac{T_1}{T_0} \right)^{1/2}$ . The authors thank Yu. P. Rayzer for dis-

cussions. There are 2 figures and 11 Soviet references.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of Chemical Physics of the Academy of Sciences USSR)

SUBMITTED: June 12, 1961

Card 4/5

KOMPANEYETS, A.S., prof.

Gravitation, space, and time. Priroda 50 no.5:17-23 My '61.  
(MIRA 14:5)

1. Institut khimicheskoy fiziki AN SSSR (Moskva).  
(Mechanics, Celestial)

KOGAN, A.M. (Moskva); KOMPANEYETS, A.S. (Moskva); KRAYNOV, V.P. (Moskva)

Propagation of a strong explosion in an inhomogeneous medium. PMTF  
no.6:3-7 N-D 162. (MIRA 16:6)

1. Institut khimicheskoy fiziki AN SSSR.  
(Explosions)

SHUPPE, G.N.; KOMPANEYETS, A.S.

Concerning V.A. Gor'kov's article "The first symposium on field emission." Radiotekh. i elektron. 7 no.9:1686-8 '62.

(MIRA 15:9)

(Field emission) (Gor'kov, V.A.)



KOMPANEYETS, A.S.; LANTSBURG, Ye.Ya.

Analyzing the propagation of a nonequilibrium thermal wave on the assumption of a finite velocity of light. Zhur. eksp. i teor. fiz. 43 no.1:234-240 J1 '62. (MIRA 15:9)

1. Institut khimicheskoy fiziki AN SSSR.  
(Heat—Transmission) (Light—Speed)

S/056/62/043/006/037/067  
B125/B102

AUTHOR: Kompaneyets, A. S.

TITLE: The regularization of the classical equations of electrodynamics

PERIODICAL: Zhurnal eksperimental'noy i teoreticheskoy fiziki, v. 43, no. 6(12), 1962, 2185 - 2187

TEXT: A relativistically invariant, stable, and cylindrical model of an extended charge can be obtained by compensating the electromagnetic field and the "meson" field without introducing a new constant into the theory. In the rest system of the charge as a whole the usual equalities

$\Delta\varphi = -4\pi q$  (2),  $\Delta\psi + \kappa^2\psi = 4\pi q\lambda$  (3),  $q(\vec{E} + \lambda\vec{F}) = 0$  (4) follow from the relativistically invariant Lagrangian.  $\varphi, \psi$  and  $q$  are the time components of the potentials and the current density, and  $\vec{E}$  and  $\vec{F}$  are the electrostatic and "mesostatic" fields. The first solution  $q = 0$  of the equation (4) for the equilibrium of the forces holds for  $r > r_0$ , whereas the second solution  $\vec{E} = -\lambda\vec{F}$  holds within the sphere  $r \leq r_0$  occupied by the charge.

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The regularization of...

S/056/62/043/006/037/067  
B125/B102

Substituting  $\varphi$  in (2) and (3), the solutions arrived at are given by  $4\pi\rho = -\lambda\kappa^2\psi/(1-\lambda^2)$  and  $\Delta\psi = -\kappa^2\psi(1-\lambda^2)$  for  $r \leq r_0$ ,  $\Delta\psi = -\kappa^2\psi$  for  $r > r_0$ , where  $\varphi = -\lambda\psi + C$ . The meson field is a variable in space outside the charge, also but its small spatial period prevents it being observed. The other variable, involving a meson field that is quickly damped in space, cannot be brought into a stable equilibrium with the electrostatic fields. Owing to the continuity of the electrostatic potential and of the electrostatic field

$$C = \frac{e}{r_0} \left[ 1 - \frac{\lg v\kappa r_0}{v\kappa r_0} \right]^{-1}, \quad (9)$$

is obtained, where  $v = (1-\lambda^2)^{-1/2}$ , leading to

$$\mathcal{E} = \frac{1}{2} \int \rho (\varphi + \lambda\psi) dv = \frac{C}{2} \int \rho dv = \frac{Ce}{2}. \quad (11)$$

and, because of

$$v = \frac{\pi}{2\kappa r_0} + \epsilon, \quad (12),$$

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The regularization of...

S/056/62/043/006/037/067  
B125/B102.

to

$$g = \frac{e^2}{2r_0} \left[ 1 + \frac{c_1 g e \kappa r_0}{\pi/2 + e \kappa r_0} \right]^{-1} \quad (13)$$

for the charge energy. The minimum value (stable equilibrium)  
 $\xi = e^2 \kappa e / 3.54$  is about  $e \kappa r_0 = 2.3$ . The values  $\kappa e = 3.54 mc^2/e^2$  and  
 $r_0 = 0.65 e^2/mc^2$  are obtained by equating  $\xi$  and  $mc^2$  (rest energy). It is  
the product  $\kappa e$  only that is important and not the individual quantity.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR (Institute of  
Chemical Physics of the Academy of Sciences USSR)

SUBMITTED: June 28, 1962

Card 3/3

35689

S/020/62/143/001/012/030  
B104/B108

24.6730

AUTHORS: Zel'manov, I. L., Kompaneyets, A. S., and Sayasov, Yu. S.

TITLE: Phase motion of particles in accelerators with variable parameters

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 1, 1962, 72-73

TEXT: The phase oscillation equation of particles in an accelerator whose parameters have negligible random disturbances is in linear approximation

$$\frac{d^2 q}{dt^2} + \omega^2(t) q = a(t) \psi(t), \quad (1).$$

$q$  is the distance between the particle observed and an "ideal" synchronous particle,  $\psi$  is a random quantity characterizing the phase deviation of the synchronous particle from the "ideal" particle,  $\omega^2(t)$  and  $a(t)$  are known functions slowly changing with time. The phase oscillations in an "ideal" accelerator are described by

$$\frac{d^2 q_0}{dt^2} + \omega^2(t) q_0 = 0, \quad (2),$$

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Phase motion of particles ...

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B104/B108

where  $Q = q - q_0$  and  $\dot{Q} = \dot{q} - \dot{q}_0$  characterize the deviations of the position and velocity of the particle observed from the "ideal" one. Assuming that  $\overline{\psi(t)} = 0$ ,  $\overline{\psi(t) \psi(t')} = \psi_0^2 \delta(t - t')$  and that the solutions of (1) and (2) may be found in Wentzel-Kramers-Brillouin's approximation,

$$\frac{\partial \Phi}{\partial t} + \dot{Q} \frac{\partial \Phi}{\partial Q} - \omega^2 Q \frac{\partial \Phi}{\partial \dot{Q}} = v(t) \left( \frac{\partial^2 \Phi}{\partial Q^2} + \omega^2(t) \frac{\partial^2 \Phi}{\partial \dot{Q}^2} \right), \quad (3)$$

$$v(t) = \frac{\psi_0^2}{2\omega(t)} \left( \frac{a^2(t)}{\omega(t)} + \omega^2(t) \int_{t_0}^t \frac{a^2(\tau)}{\omega(\tau)} d\tau \right).$$

is obtained for the probability density  $\Phi(t, Q, \dot{Q})$ . As a solution of (3),

$$\Phi = \frac{1}{4\pi \int_{t_0}^t v \omega dt} \exp \left( - \frac{Q^2}{\frac{4}{\omega} \int_{t_0}^t v \omega dt} - \frac{\dot{Q}^2}{4\omega \int_{t_0}^t v \omega dt} \right), \quad (9)$$

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Phase motion of particles ...

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B104/B108

is obtained. This solution holds for any dynamic system which has a potential  $\frac{1}{2}\omega^2(t)q^2$  slowly changing with time, and which is affected by random forces  $a(t)\psi(t)$ . The reference to the English-language publication reads as follows: S. Livingstone, Accelerators, 1956.

ASSOCIATION: Institut khimicheskoy fiziki Akademii nauk SSSR  
(Institute of Chemical Physics of the Academy of Sciences USSR)

PRESENTED: October 16, 1961, by V. N. Kondrat'yev, Academician

SUBMITTED: October 10, 1961

Card 3/3

KOMPANEYETS, Aleksandr Solomonovich; KOZLOV, V.D., red.;  
KOLESNIKOVA, A.P., tekhn. red.

[Shock waves] Udarnye volny. Moskva, Fizmatgiz, 1963.  
90 p. (MIRA 16:11)

(Shock waves)



IVANOV, Boris Nikolayevich; ~~Ko~~PANEYETS, A.S., otv. red.; LARIN, S.I.,  
red.izd-va; POLYAKOVA, T.V., tekhn. red.

[New physics; review of the fundamental principles of modern  
physics] Novaia fizika; obzor osnovnykh printsipov sovremennoi  
fiziki. Moskva, Izd-vo Akad. nauk SSSR, 1963. 134 p.  
(MIRA 16:3)

(Physics)

L 13845-63

EWI(1)/BDS AFPTC/ASD

ACCESSION NR: AP3003153

8/0056/63/044/006/2169/2172

AUTHOR: Kompaneyets, A. S.

TITLE: Classical model of charged particle with momentum

SOURCE: Zhurnal skoper. i teor. fiziki, v. 44, no. 6, 1963, 2169-2172

TOPIC TAGS: charged particles, classical electrodynamics

ABSTRACT: It is shown on the basis of equations proposed by the author in an earlier paper (ZhETF v. 43, 2185, 1962) that by balancing the repulsive electromagnetic field with an attractive meson field it is possible to construct a stable classical model of a charged particle possessing angular momentum. The model can be assumed to possess not only static charge density, but also stationary current distribution. Such a model can exist without radiating, provided the electromagnetic force is balanced everywhere by the meson force. The model leads to a nonlinear system of equations which by some modification can be made complete and solved numerically if higher-order terms are neglected. Orig. art. has: 24 formulas.

ASSOCIATION: Institute of Chemical Physics Academy of Sciences

Card 1/2/

KOMPANEYETS, A.S.

Diffusion from an instantaneous source in a gravitational field.  
Dokl.AN SSSR 149 no.3:554-556 Mr '63. (MIRA 16:4)

1. Institut khimicheskoy fiziki AN SSSR. Predstavleno akademikom  
V.N.Kondrat'yevym.

(Diffusion)

KOMPANEYETS, A. S.

"Calculation of the Excited States of Atoms and Ions by the Self-Consistent Fields Method."

report submitted to 11th Intl Spectroscopy Colloq, Belgrade, 30 Sep-4 Oct 63.

KOMPANEYETS, Aleksandr Solomonovich, doktor fiz.-mat. nauk, prof.;  
FAYNBOYM, I.B., red.

[At the front edge of science; development of the fundamental laws of physics] Na perednem krae nauki; razvitie osnovnykh zakonov fiziki. Moskva, Izd-vo "Znanie," 1964. 46 p. (Novoe v zhizni, nauke, tekhnike. IX Seriya: Fizika, matematika, astronomiia, no.6) (MIRA 17:5)

KOMPANEYETS, Aleksandr Solomonovich; VIRKO, I.G., red.

[What is quantum mechanics?] Chto takoe kvantovaia me-  
khanika? Moskva, Nauka, 1964. 130 p. (MIRA 17:12)

ACCESSION NR: AP4032876

S/0051/64/016/004/0706/0708

AUTHOR: Kompaneyets, A.S.

TITLE: Field of light wave acting on an electron in the self-consistent field method

SOURCE: Optika i spektroskopiya, v.16, no.4, 1964, 706-708

TOPIC TAGS: electron wave function, electron transition, transition matrix element, atomic core field, self consistent field method

ABSTRACT: In calculation of atomic wave functions by the self-consistent field method the many-electron problem reduced to a one-electron one. Generally, the wave function of the optical electron is determined as though the electron were moving simply in the field of the nucleus and atomic core. I.B.Bersuker (Uch.zap.Kishenevsk univ. (fiz.mat.), 24,63,1956) called attention to the fact that in calculating electron transition probabilities by this method one should bear in mind that the electron is acted on by a field distorted by the core. Initially, Bersuker took this distortion into account by treating the atomic core as a dielectric sphere located in the external field. In subsequent investigations (I.B.Bersuker, Opt.i spektro.9,

Card 1/2

ACCESSION NR: AP4032076

605,1960; Izv.AN SSSR,Ser.fiz.22,750,1958, and I.B.Bersuker and M.G.Vesolov,Izv.AN SSSR,Ser.fiz.22,662,1958) the problem was solved by a more rigorous quantum mechanical method in the adiabatic approximation. The purpose of the present brief note is to show that this approximation is not necessary; accordingly, there is derived a more general formula of the dispersion type, which in the low frequency limit transforms to the expressions derived in the later work of Bersuker (loc.cit.). It is noted that corrections for polarizability of the core can be introduced into the formula. "In conclusion, I thank A.V.Ivanova for indicating the pertinent literature." Orig.art.has: 8 formulas.

ASSOCIATION: none

SUBMITTED: 08Jul63

DATE ACQ: 07May64

ENCL: 00

SUB CODE: NP

NR REF SOV: 004

OTHER: 000

Card 2/2



10/6-65 EWT(1)/EMP(M)/EEC(t)/T Po-1/PE-5/Pq-1/Pq-2/Pq-3/Pq-4 IIP(c) GW

TITLE: Solution of the equations of gravitation in a homogeneous anisotropic model

LIC 228

sp5000354

of the equations can be analytically continued on both sides of the singularity. The solution involves a determination of time-dependent momentum tensor components in a co-moving synchronous reference frame, which is shown to be consistent with the conditions made. A solution is also obtained for a nonrelativistic gas with constant isentropy index. Orig. art. has: 31 formulas. "We  
Zeldovich, Ye. M. Lifshits, L. P. Pitaevsky, and I. M. Lifshits.

Institute of Chemical Physics, Academy of Sciences of the USSR  
Moscow, U.S.S.R.

SUBMITTED: 23May64

ENCL: 00

NR REF: 02

NR REF SOV: 004

OTHER: 001

Card 2/2

KOMPANEYETS, Aleksandr Solomonovich, doktor fiz.-matem. nauk,  
~~prof., FAYNBOYM, I.D., red.~~

[Symmetry] O simmetrii. Moskva, Znanie, 1965. 44 p.  
(Novoe v zhizni, nauke, tekhnike. IX Seriya: Fizika, ma-  
tematika, astronomia, no.6)

[Symmetry in the microcosm] Simmetriia v mikromire. Moskva,  
Znanie, 1965. 44 p. (Novoe v zhizni, nauke, tekhnike. IX Se-  
riia: Fizika, matematika, astronomia, no.7) (MIRA 18:4)

KOMPANEYETS, A.S.; MOSHKINA, R.I.

Applicability of a radical chain scheme to the kinetics of high-temperature methane oxidation initiated by nitrogen oxides. Kin. i kat. 6 no. 6:1098-1101 N-B '65 (MIRA 19:1)

1. Institut khimicheskoy fiziki AN SSSR. Submitted November 25, 1964.